IN THE CLAIMS

1. (cancelled)

2. (cancelled)

3. (currently amended) A method of designing a filter for a multiple access communications system which minimizes crosstalk between channels comprising the step of identifying signals s2(t) having a first property by which ~~the~~an autocorrelation function associated with said s2(t) signals decay rapidly from ~~the~~a central lobe~~, that is,~~ at a higher than 1/x rate which is typical of a wavelength division multiplexing communications system and having a second property in which the zero points of the autocorrelations function have high order multiplicities, the method -further comprising the steps of:

(a) choosing a signal s(t) which is periodically orthogonal to its translates;

(b) determining a first autocorrelation function associated with s(t);

(c) denoting the Fourier transform of s(t) to be S(f);

(d) denoting the Fourier transform of said first autocorrelation function of s(t) as H(f);

(e) determining said Fourier transform, H(f), of said first autocorrelation function of s(t) in accordance with the equation $H(f) = |S(f)|^2$;

(f) forming the Fourier transform of a second autocorrelation function by convolving H(f) with itself;

(g) determining said convolution according to the equation

G(f) = Conv(H(f), H(f)), wherein G(f) is a new autocorrelation function by convolving H(f) with itself;

(h) determining the square root of G(f);

(i) denoting said square root of G(f) as S2(f); and

(j) taking the inverse Fourier transform of S2(f).

4. (previously presented) The method of claim 3 wherein s(t) is a sinc function.

5. (previously presented) The method of claim 3 wherein s(t) is a signal whose autocorrelation function is a Coifman Meyer window.

6. (previously presented) The method of claim 3 wherein s(t) is selected from any variety of wavelets at any individual scale.

7. (previously presented) The method of claim 3 wherein s(t) is any function whose translates are periodically orthogonal to s(t).

8. (cancelled)

9. (cancelled)

10. (cancelled)

11. (cancelled)

12. (cancelled)

13. (cancelled)

14. (cancelled)

15. (cancelled)

16. (cancelled)

17. (cancelled)

18. (cancelled)

19. (cancelled)

20. (cancelled)

21. (cancelled)

22. (cancelled)

23. (cancelled)

24. (cancelled)

25. (cancelled)

26. (cancelled)

27. (cancelled)

28. (cancelled)

29. (cancelled)

30. (currently amended) An electromagnetic matched filter based multiple access system for a communications system which minimizes crosstalk between channels designed in accordance with a method comprising the step of identifying signals having a property by which ~~the~~an autocorrelation function associated with said signals decay rapidly from ~~the~~a central lobe~~,~~ ~~that is,~~ at a higher than 1/x rate which is typical of a wavelength division multiplexing communications system, the electromagnetic matched filter based multiple access system comprising:

~~(k)~~(a) a source of modulated pulses from a digital data stream;

~~(l)~~(b) a first filter for shaping the modulated pulse into a desired pulse for transmission across the communication medium;

~~(m)~~(c) a transmission medium which is accurately modeled;

~~(n)~~(d) a second filter which is matched to the pulse which exits the communications medium; and

~~(o)~~(e) a detector which converts the modulated pulse stream into the original digital data stream;

wherein said first filter is designed in accordance with a method comprising the steps of:

~~(p)~~(f) choosing a signal s(t) which is periodically orthogonal to its translates;

~~(q)~~(g) determining a first autocorrelation function associated with s(t);

~~(r)~~(h) denoting the Fourier transform of s(t) to be S(f);

~~(s)~~(i) denoting the Fourier transform of said first autocorrelation function of s(t) as H(f);

~~(t)~~(j) determining said Fourier transform, H(f), of said first autocorrelation function of s(t) in accordance with the equation $H(f) = |S(f)|^2$;

~~(u)~~(k) forming the Fourier transform of a second autocorrelation function by convolving H(f) with itself;

~~(v)~~(l) determining said convolution according to the equation G(f) = Conv(H(f), H(f)), wherein G(f) is a new autocorrelation function by convolving H(f) with itself;

~~(w)~~(m) determining the square root of G(f);

~~(x)~~(n) denoting said square root of G(f) as S2(f); and

~~(y)~~(o) taking the inverse Fourier transform of S2(f).

31. (Original) The electromagnetic matched filter based multiple access system of claim 30 wherein said first and second filters are identical.

32. (currently amended) The electromagnetic matched filter based multiple access system of claim 30 wherein said first filter is designed in accordance with a method comprising

the step of identifying signals s2(t) having a first property by which the autocorrelation function associated with said s2(t) signals decay rapidly from the central lobe~~, that is,~~ at a higher than 1/x rate which is typical of a wavelength division multiplexing communications system and having a second property in which the zero points of the autocorrelations function have high order multiplicities.

33. (Original) The electromagnetic matched filter based multiple access system of claim 32 wherein s(t) is any function whose translates are periodically orthogonal to s(t).

34. (currently amended) The electromagnetic matched filter based multiple access system of claim 30 wherein said second filter is designed in accordance with a method comprising the step of identifying signals s2(t) having a first property by which the autocorrelation function associated with said s2(t) signals decay rapidly from the central lobe~~, that is,~~ at a higher than 1/x rate which is typical of a wavelength division multiplexing communications system and having a second property in which the zero points of the autocorrelations function have high order multiplicities.

35. (Original)The electromagnetic matched filter based multiple access system of claim 34 wherein s(t) is any function whose translates are periodically orthogonal to s(t).

36. (cancelled)

37. (cancelled)